

Remarks

Claims 11 to 20 are pending in this application. Claims 11 and 14-16 have been amended. Claims 19-20 have been newly added.

The examiner is requested to favorably reconsider the objection to the abstract of the disclosure in view of the substitute abstract submitted herewith.

The examiner is requested to favorably reconsider the rejection under 35 U.S.C. 112, second paragraph in view of the foregoing amendment. The objectionable language "can be" has been replaced by - - is - -; and "the mixture" recited at claims 14 and 15 is now set forth with the requisite statutory particularity as "the mixture thus obtained..."

New claims 19 and 20 are drawn to the alternative features which were referred to in original claims 14 and 15.

Claims 11, 12, 14-16 and 18 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kongshaug et al. This rejection is traversed. The revised claims now clearly recite the essential features including the required catalyst, and since not all of the claim elements are disclosed by Kongshaug et al., there is no basis for anticipation. Favorable reconsideration is solicited.

Claims 11-18 stand rejected under 35 U.S.C. 103(a) as being obvious in view of Kongshaug et al. considered in view of Fetzer et al. This rejection is traversed. The closest prior art appears to be Kongshaug et al. According to this reference the amount of N_2O formed when performing the Ostwald process in a reactor can be reduced by providing a sufficient retention time for the product gas mixture at high temperature between the noble metal gauze catalyst and the heat exchanger. This leads to a decomposition of the N_2O formed, see column 3, lines 1 to 9. Only as an additional option is it stated that a catalyst for decomposing N_2O may be provided after the noble metal gauze catalyst, see column 3, lines 10 to 13. Thus, the finding of this reference is based on a totally different principle for decomposing N_2O . According to the reference, N_2O is thermally decomposed whereas according to the present invention N_2O is catalytically decomposed. The catalytic decomposition may be employed according to Kongshaug et al. only in addition to the thermal decomposition. The process according to Kongshaug et al. has the particular disadvantage that the distance between the noble metal gauze catalyst and the heat exchanger must be increased, see column 3, lines 7 to 9. Thus, there is a need to implement changes in the construction of the reactor, which shall be avoided according to the present invention. The process according to the present invention allows for the integration of the process in existing reactors. The catalyst employed according to the present invention, furthermore, has specific advantages in the decomposition of N_2O .

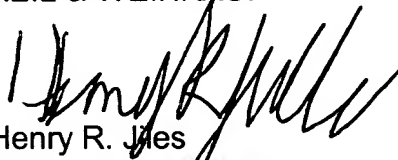
SCHUMACHER et al.

Serial No. 09/674,047

To the extent necessary, applicant(s) petition for an Extension of Time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE IN THE SPECIFICATION

Please delete the previous abstract:

~~In a reactor for the catalytic oxidation of ammonia to form nitrogen oxides which has a noble metal gauze catalyst and a heat exchanger in that order in the direction of flow, a catalyst for the decomposition of N_2O is located between the noble metal gauze catalyst and the heat exchanger.~~

~~—— In a process for the catalytic decomposition of N_2O in a gas mixture obtained in the preparation of nitric acid by catalytic oxidation of ammonia, where the N_2O is decomposed catalytically over a catalyst for the decomposition of N_2O , the hot gas mixture obtained from the catalytic oxidation of ammonia is brought to contact with the catalyst for the decomposition of N_2O prior to subsequent cooling.~~

Please enter the new abstract as follows:

A reactor for the catalytic oxidation of ammonia to form nitrogen oxides which has a noble metal gauze catalyst and a heat exchanger in that order in the direction of flow, a catalyst for the decomposition of N_2O is located between the noble metal gauze catalyst and the heat exchanger and in a process for the catalytic decomposition of N_2O in a gas mixture obtained in the preparation of nitric acid by catalytic oxidation of ammonia, where the N_2O is decomposed catalytically over a catalyst for the decomposition of N_2O , the hot gas mixture obtained from the catalytic oxidation of ammonia is brought to contact with the catalyst for the decomposition of N_2O prior to subsequent cooling.

VERSION WITH MARKINGS TO SHOW CHANGES MADE IN THE CLAIMS

Please amend claim 11, 14-16 and newly added 19-20 as follows:

11.(amended) A reactor for the catalytic oxidation of ammonia to nitrogen oxides, which contains a noble metal gauze catalyst and a heat exchanger in that order in the direction of flow and has a catalyst for the decomposition of N_2O which [can be] is prepared by combining $CuAl_2O_4$ with tin, lead and/or an element of main group II or transition group II of the Periodic Table of the Elements as oxide or salt or in elemental form and subsequently calcining the mixture thus obtained at from 300 to 1300°C and a pressure in the range from 0.1 to 200 bar located between the noble metal gauze catalyst and the heat exchanger.

14.(amended) An apparatus for preparing nitric acid from ammonia, comprising in this order

- a reactor as claimed in claim 11,
- an absorption unit for the absorption of nitrogen oxides in an aqueous medium [and, if desired,
- a reduction unit for the selective catalytic reduction of nitrogen oxides].

15.(amended) An apparatus for preparing nitric acid from ammonia, comprising in this order

- a reactor as claimed in claim 12,
- an absorption unit for the absorption of nitrogen oxides in an aqueous medium [and, if desired,
- a reduction unit for the selective catalytic reduction of nitrogen oxides].

16.(amended) A process for the catalytic decomposition of N_2O in a gas mixture

obtained in the preparation of nitric acid by catalytic oxidation of ammonia in a reactor having a noble metal gauze catalyst and a heat exchanger in that order in the flow direction, where N_2O is decomposed catalytically over a catalyst for the decomposition of N_2O located between the noble metal catalyst and the heat exchanger so that the hot gas mixture obtained from the catalytic oxidation of ammonia is brought into contact with the catalyst for the decomposition of N_2O prior to subsequent cooling, wherein the catalyst for the decomposition of N_2O [can be] is prepared by combining $CuAl_2O_4$ with tin, lead and/or an element of main group II or transition group II of the Periodic Table of the Elements as oxide or salt or in elemental form and subsequently calcining the mixture thus obtained at from 300 to 1300°C and a pressure in the range from 0.1 to 200 bar.

Please add new claims 19 and 20, as follows:

19.(newly added) An apparatus for preparing nitric acid from ammonia, comprising in this order

- a reactor as claimed in claim 14,
- an absorption unit for the absorption of nitrogen oxides in an aqueous medium and,
- a reduction unit for the selective catalytic reduction of nitrogen oxides.

20.(newly added) An apparatus for preparing nitric acid from ammonia, comprising in this order

- a reactor as claimed in claim 15,
- an absorption unit for the absorption of nitrogen oxides in an aqueous medium and,
- a reduction unit for the selective catalytic reduction of nitrogen oxides.

COPY OF ALL CLAIMS

11. A reactor for the catalytic oxidation of ammonia to nitrogen oxides, which contains a noble metal gauze catalyst and a heat exchanger in that order in the direction of flow and has a catalyst for the decomposition of N_2O which is prepared by combining $CuAl_2O_4$ with tin, lead and/or an element of main group II or transition group II of the Periodic Table of the Elements as oxide or salt or in elemental form and subsequently calcining the mixture thus obtained at from 300 to 1300°C and a pressure in the range from 0.1 to 200 bar located between the noble metal gauze catalyst and the heat exchanger.
12. A reactor as claimed in claim 11, wherein a noble metal catalyst for the decomposition of N_2O .
13. A reactor as claimed in claim 11, wherein the catalyst for the decomposition of N_2O is installed as a fixed bed having a height of from 2 to 50 cm.
14. An apparatus for preparing nitric acid from ammonia, comprising in this order
 - a reactor as claimed in claim 11,
 - an absorption unit for the absorption of nitrogen oxides in an aqueous medium.
15. An apparatus for preparing nitric acid from ammonia, comprising in this order
 - a reactor as claimed in claim 12,
 - an absorption unit for the absorption of nitrogen oxides in an aqueous medium.

16. A process for the catalytic decomposition of N_2O in a gas mixture obtained in the preparation of nitric acid by catalytic oxidation of ammonia in a reactor having a noble metal gauze catalyst and a heat exchanger in that order in the flow direction, where N_2O is decomposed catalytically over a catalyst for the decomposition of N_2O located between the noble metal catalyst and the heat exchanger so that the hot gas mixture obtained from the catalytic oxidation of ammonia is brought into contact with the catalyst for the decomposition of N_2O prior to subsequent cooling, wherein the catalyst for the decomposition of N_2O is prepared by combining $CuAl_2O_4$ with tin, lead and/or an element of main group II or transition group II of the Periodic Table of the Elements as oxide or salt or in elemental form and subsequently calcining the mixture thus obtained at from 300 to 1300°C and a pressure in the range from 0.1 to 200 bar.
17. A process as claimed in claim 16, wherein the residence time over the catalyst for the decomposition of N_2O is less than 0.1 s.
18. A process as claimed in claim 16, wherein the decomposition of N_2O is carried out at from 600 to 959°C and/or at a pressure in the range from 1 to 15 bar.
19. An apparatus for preparing nitric acid from ammonia, comprising in this order
 - a reactor as claimed in claim 14,
 - an absorption unit for the absorption of nitrogen oxides in an aqueous medium and,
 - a reduction unit for the selective catalytic reduction of nitrogen oxides.

20. An apparatus for preparing nitric acid from ammonia, comprising in this order
- a reactor as claimed in claim 15,
 - an absorption unit for the absorption of nitrogen oxides in an aqueous medium and,
 - a reduction unit for the selective catalytic reduction of nitrogen oxides.